T0084-S Suborbital Test of a Robotics-Based Method for In-Orbit Identification of Spacecraft Inertia Properties

Problem Statement

- Spacecraft's flight control system requires correct inertia properties of the spacecraft. Inertia properties may change in orbit and thus they need to be re-identified in orbit.
- A robotics-based on-orbit inertia parameters identification method has been proposed. This flight is to test a flight-in-flight payload technology to support the experimental study of the new inertia identification method.
- Potential users are NASA, US Air Force, and space companies doing robotic on-orbit services or robotic exploration missions.

Technology Development Team

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Proposed Flight Experiment

Experiment Readiness:

- The payload of the first launch has been made, tested, and ready for launch from Spaceport America on November 12, 2013.

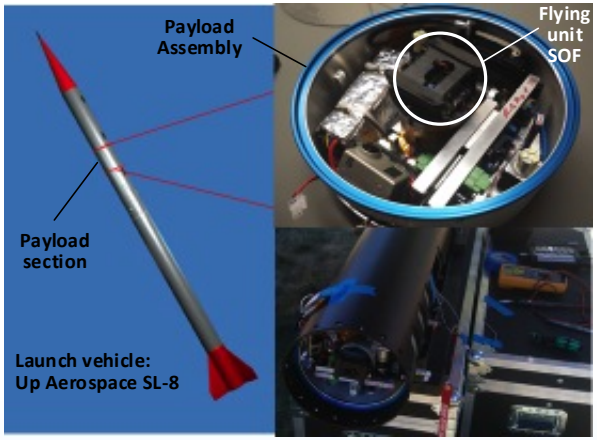
Test Vehicles:

- Suborbital flight with Up Aerospace's vehicle: UPA SL-8

Test Environment:

- A much larger and human-operated version of the payload has been flown on parabolic flights with NASA's Microgravity University Program in 2008 and 2009. This flight is an upgraded testing.

Test Apparatus Description:



Technology Maturation

- The criteria for the flight-in-flight payload technology to reach TRL6 are that the flying unit (SOF) is successfully ejected, flying, pulled back, and secured before landing.
- Behavior of the above-mentioned actions can be analyzed by examining the recorded telemetry data of the flying unit after launch.
- More tests and flights are needed to have the new on-orbit inertia identification technology reach TRL6 level.

Objective of Proposed Experiment

- Objective of this flight is to test the two functions of the flight-in-flight payload technology: (1) releases a flying unit when microgravity is reached and records the motion state of the unit; and (2) captures, retracts, and secures the flying unit for landing.
- The telemetry data includes 3D motion state and video imaging. The information will be used to verify the identification algorithm.

TA: NASA Technology Roadmap Area 04 - Robotics, Tele-Robotics and Autonomous Systems

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